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From "Smart in the Box" to "Smart in the City": Rethinking the Socially Sustainable Smart City in Context

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From 'Smart in the box' to 'Smart in the city' – rethinking the socially sustainable smart city in context --Manuscript Draft--

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From 'Smart in the box' to 'Smart in the city' – Rethinking the Socially Sustainable Smart City in Context

Abstract

This paper focuses on the importance of framing and conceiving smart urban initiatives and schemes in a highly context-sensitive way, and argues that place-based approaches are essential for enhancing the social sustainability of smart cities. It does so highlighting how such perspective is often ignored by discourses and visions that favor generalized and socially skewed ways of framing the 'city' as well as the citizens who are expected to become 'smart' and benefit from high technologies. These, the paper argues, leave out the important nuances and social and spatial 'interstices' that make places unique, and by doing so weaken the ability of smart to be inclusive and afford a rich landscape of technological appropriation making cities more resilient.

Introduction

The smart city narrative has recently become closely associated with the concept of sustainability. Early warning systems and control room monitoring enabled through sensor technology make an important contribution to mitigation and anticipation of the shock impacts of climate change. Smart grids and water monitoring systems enable resource efficiency and feedback loops. Whilst the operational elements of smart cities are largely uncontested, there nevertheless exists a need to shine a sharper light on the long-term sustainability of digital urbanism. Concerns have emerged regarding the packaged smart city: the delineated norms and standards, technological fixes and comprehensive marketing solutions to complex urban problems, promoted by multinational software and hardware firms. In this paper, we refer to this prevalently pre-packaged, product-like version of the smart city, as the 'smart in a box' and interrogate the social sustainability of technology-driven solutions to complex social issues. In writing this paper we aim at looking at a number of initiatives, most of which have been reviewed before, but in a way that frames and highlights a different interpretation of this phenomenon and argues for the 'smart city out of the box' or a 'smart *in* the city' approach to incorporating digital technologies and media into context-sensitive city making. The central position of the paper is that this is significantly more socially sustainable. While we posit a particular argument with regard to how we think about technology-embedded urbanism, our intention is to provide an alternative lens to analyzing and understanding the nature of smart urbanism. Foregrounding the technical aspects of smart, we argue, makes the qualities of place and the human agency that crucially contribute to city-making invisible. Revealing and re-affirming these and their role through research, and then re-embedding them into smart urbanism practice, is fundamental to constructing a socially sustainable vision of the future city.

The paper structure unfolds as follows: we begin discussing what is often a pre-packaged, generalized and idealized interpretation of what the city (and the smart city) is. This is referred to across this paper as the 'smart city in a box' to highlight the over-simplification of the civic concept and the standardization of issues in much of the smart-related discourse and practice. We provide a critique that questions notions of citizenship and social sustainability embedded in the assumptions that drive many of these initiatives. The increasingly ubiquitous nature of the smart city narrative – its policy mobility and application to many parts of the global North and South - necessitates a global perspective. The purposeful inclusion of literature on the global South has implicit and explicit aims in this regard. We argue from a standpoint of multiple urbanisms, where qualities such as informality and urban inequality emphasized in the literature on cities in the global South, are acknowledged as issues that resonate globally. More explicitly, we recognize that the work on cities of the global

South provide valuable insights into the many challenges and potential solutions that potentially enable more socially sustainable cities. In short, a global focus that learns from the north and south provides a more robust resource for exploring what a socially progressive and sustainable smart city could look like. We further conclude on the implications this work would have for future research on sustainable smart cities.

Problematizing Sustainable ‘Smart’

Defining what a smart city is or might be is an exercise that can range from the apparently obvious to the near impossible. The vast amount of publicly available information about smart city-related concepts, products and envisaged solutions mirrors the utopian hype that Graham and Marvin (1996) critically described as characterizing the emergence of urban advanced telecommunications and cyberspace at the end of the 20th century. Much of this presents a generic concept of the smart city as an urban revolution in the making. While concepts of smart do not necessarily entirely or exclusively align with views of ‘digital’ urbanism (see for instance Caragliu et al, 2011), any quick Internet or literature search will reveal how the role of ICTs dominates how the phenomenon is described. This ‘revolution’ seems always to be enabled by a series of technological products – be them infrastructural or software-based ones – and ‘solutions’ that can be superimposed on and merged with elements of the built environment in both newly and appositely built towns, or as retrofits to existing cities. The visual language of corporate smart city visions reveals an ‘ideal city’ that forms a coherent whole, seamlessly connected through ICT infrastructure and run on big data. Recently the development of check boxes of codes and standards further perpetuates the ‘city/neighborhood in a box’ idea. This pre-packaged city concept vastly contrasts with the messy textures of the real city. The ubiquity and homogeneity of the visual language of these visions (Rose, 2017) highlights how particularly stark the contradictions between what is idealized and what is real are. These are stronger for cities which do not conform to the one-size-fits-all large, hi-tech metropolis model offered, and are even more blatant in the global South. Furthermore, the language of smart is often used to market edge cities/neighborhoods that perpetuate urban sprawl. These urban fantasies, as Watson (2014) refers to them, are not only indicative of exclusionary urban development, but also real estate interests driving a spatial vision that defies sustainable and compact urban development (Ballard et al, 2017).

More critical accounts of the phenomenon have of course highlighted how diverse and complex this landscape is. Various typologies have evolved in the corporate and governance spheres of what smart cities are capable of, and should be addressing. Three trends in contemporary discussions in the media and literature are discernable (Odendaal, 2016). The first is a seemingly more direct engagement with the social and cultural coordinates of urbanity. In many cases this is marketing language used to augment corporate agendas, a visual language that emphasizes global connection and a ubiquitous urban vision of enhanced efficiency and seamless service delivery. The second is an engagement with natural sustainability and specifically climate change (Cowley et al, 2018), reinforcing the relationship between resilience, early warning and disaster management and intertwining with the ‘eco-city’ concept (Caprotti, 2014). The third shift is an explicit acknowledgement of other infrastructure services (Odendaal, 2016). The relationship between ICT and other utilities has always been implicit. Municipal utility billing systems rely heavily on centralized information capture and processing for example. Explicit references to technology enabled management of services and digital innovations such as smart grids focus on the interrelationship between utility parts. What emerges is a narrative that suggests comprehensive city making through technological connection; a “modern infrastructure ideal” (Graham and Marvin,

2001) where the connection between the technical and the social, the technical and the natural, and between infrastructure functions all contribute to seamless and efficient urban systems.

To make sense of tentative and partial accounts of this range of work and approaches, Mora et al (2017) offer – through a bibliometric longitudinal analysis of research – an extremely useful overview of the status and directions of the debate, beyond the hype easily found on the Web. This on the one hand confirms the strong role of what the authors call a ‘corporate’ tech-driven model of the smart city, which “fails to account for the social and cultural challenges that smart-city developments pose in anything but technological terms” (p.19). However, a strand of mainly academic literature pointing at a ‘holistic’ and ‘human-centric’ interpretation of the phenomenon and its opportunities is identified as a promising counterpoint to technocratic rhetoric.

Adding to, and complementing those observations, the point this paper wants to highlight is that the prevailing discourses on the smart city, certainly the ones with a commercial, technocratic root but also part of the scientific, R&D and critical accounts, whilst perhaps calling for a degree of connection with an often generic concept of ‘community’, tend to encourage thinking which is not as deeply engaged with the local context where smart ‘concepts’ are proposed and applied. Furthermore, it can be argued that the specific challenges and opportunities offered by place need to be brought into the fold, and require contextually embedded responses if any smart solutions are to be socially sustainable. The ‘smart city’ is too often framed as a general construct responding to generalized challenges and conditions – and often offering generalized products as ‘solutions’ to these. This in turn makes smart urbanism much less of a re-invention of place and more of a re-mediation (Bolter and Grusing, 1999: 182) and technological fixing of take-for-granted and partial views of what the city is and what its citizens do and need. Smart seems – in other words – much more of a hi-tech endowment of the status quo, and confirmation of a recent middle-class oriented drive toward urban development and management trajectories, than a movement supporting any major re-invention of how we conceive urban space and more generally inhabitation. We argue that this leaves little room for the structural changes and fresh thinking necessary to enable social and ecological sustainability. At worst, the smart city policy discourse can become a smokescreen that distracts from the more immediate issues facing a city (Watson, 2014). Furthermore, the generic problem formulation, and codified smart solutions that emanate from such analyses, leave little room for local innovation. This can be observed in the ways both the ‘city’ and its problems, and life within it – so the ‘citizens’ – are interpreted within much of the debate. In order to formulate sustainable smart city responses that are cognizant of the structural parameters of urban spaces as well as the local conditions that inform citizen-led responses, we argue for a more textured understanding of the ‘analog’ city and its relationship to technological evolution.

Constructing the (Smart) City

Digital technologies, hardware sensors and devices, software and big data – the fundamental components of smart urban systems – promise ways to understand and manage increasingly complex systems. Their affirmation calls for the ‘city’ to be interpreted as a critical, over-complex entity, which changes very rapidly and has become about unmanageable through traditional approaches. The spatial problem, therefore, focuses on the expected trajectories of sprawling, growing large urban centers. This is an approach that transcends and somehow precedes smart city debates and has been noted in a more general sense by Robinson (2006) who argues that “Because the analysis of global- and world-cities theorists have come to rely on identifying the significance of cities to only certain elements of the global economy, cities that are poorer, marginal to key

globalizing economic sectors or, as Manuel Castells (1983) puts it, 'structurally irrelevant' receive very little attention in this approach" (p.99). But this fits particularly well the logics of corporate smart urbanism, as economies of scale coupled with the ability to conceive easily transferable systems and 'solutions' are a key enabler of a prospected commercial offer. Therefore the city is conveniently problematized through the need to find ways to cope with large scale and growth, and the prospect of managing future 'megacities' as a consequence of unstoppable urbanization tends to be the vastly prevalent interpretation offered of the urban condition. This involves dealing with 'more': more energy consumption, more vehicular traffic, more pressure on natural resources, more people including any perceived strain from immigration - and so on. The spectre premise of mass urbanization is repeated in the introductions to most documents marketing smart technologies for cities (see for example Team Ambrosus 2018 on the Ambrosus.com blog). The 'usual suspects' of highly ranked smart cities - Singapore, Barcelona, New York, Amsterdam and London - together with purpose-built new towns like Songdo or Masdar (Forbes, 2018; Ierek, 2018; Chaturvedi, 2018) are provided as models for construction of smart cities elsewhere and for the ideas they can embed.

These cities are clearly different from each other, but they all respond to a characteristic in common: they are seen and represented as successful, growing cities (or ready to grow in the new towns case) which face a series of possible issues with resources, capacity, pollution and the management of mobility. They need to act to avoid becoming victims of their own success and the consequences of over-population and an erosion of safety, environmental quality and more generally quality of life. More than an opportunity to conceive new forms of urbanism then, and with them new economic models, smart technologies are presented as a necessary set of remedies for protecting the city and equipping it to grow in a controlled and safe way. The case for the smart city is therefore often made by employing emergency discourses, which depict the urban condition as critical if not actually terminal, and highlight the desperate need for urgent technological fixes. Cities are described as "ill-equipped to deal with the shift in population and lack the necessary scale of infrastructure required to support it" (Living PlanIT, 2011). Anil Menon argues on the CISCO blog that "With limited resources, obstacles that range from traffic congestion and pollution to infrastructure constraints and overcrowding are increasingly amplified – all of which requires a paradigm shift in how we approach and manage these types of situations" (Menon, 2013). Similarly, Schneider Electric argues on its website that "Cities face huge challenges: congestion, pollution, blackouts, crime, debt and rising costs - while competing with each other for investment, jobs and talents. Cities need to become smarter: more efficient, sustainable and liveable" (Schneider Electric, 2014), and GSMA remarks that "To ensure that the cities of the future are safe and healthy places to live and work, smart city initiatives are being established globally" (GSMA Connected Living website).

The global reference in the GSMA and other mainstream smart narratives is not incidental, and suggests a global homogeneity of issues and the consequent suitability of global solutions. As the adoption of a rhetoric of urban crisis due to exponential growth, coupled with the challenges of climate change adaptation and monitoring, suits the smart city discourse so well, the sprawling mega-cities of the South can also naturally provide both a critical-mass market and a test bed for these technologies. The smart city phenomenon is no longer simply a Northern idea. The corporate mobility of the notion of smart, together with other fashionable terms such as 'eco' and 'world-class' provide politicians and investors with the motivational discourses to justify smart city initiatives. The Modi regime in India has engaged in creating 100 smart cities in India in 10 years. The language resonates with that used in the global North. Smart cities are defined as "cities that leverage data gathered from smart sensors through a smart grid to create a city that is livable, workable and sustainable" (Sethi, 2014). Private companies such as IBM and Cisco are touted to invest in smart grid infrastructure while the government of Singapore is claimed to be interested in supporting the

construction of 10 smart cities on the Delhi-Mumbai industrial corridor. The *Business Standard's* Sunil Sethi (2014) speaks of it as a "... fuzzy, New Millenium fantasy", with technology hubs such as Bangalore and Hyderabad's technology districts coexisting with slums and *chawls*.

However, references to social sustainability and contextual engagement are tenuous. The emphasis tends to be on improved quality of life, an emphasis on climate change and the fact that vulnerability to floods and storms in over half of developing world is a reality, as well as the need for improved governance (Odendaal, 2016). Technology is the simple, as the panacea for social and environmental ills. The inherent assumption is that the economic benefits of ICT-enhanced service improvement and delivery will eventually distribute to the poor. Efficiency seems to be the key for a better life for all, in an over-expanding city. We – it is argued – are living in cities which are fundamentally out of control, and that is becoming a terminal condition. Such a dystopia can be counter-balanced by the soft utopia of smart fixing. As Söderström et al (2014) argue in their revealing analysis of IBM's Smarter Cities' discourse: "'smarter cities' is a mild utopianism: it promises efficiency rather than paradise on earth" (p.316). Digitally-assisted urbanity brings with it the benefits of the de-materialization of otherwise polluting processes (as Benedikt had argued in 1991 in his celebration of the emergence of 'cyberspace'), universal services, and above all expert systems which assist living and moving, and manage the otherwise spiraling out of control issues. The analysis on strategic trajectories for smart city developments carried out by Mora et al (2018) tends, if anything to generally confirm the presence of such bias. Particularly, what is described in the so-called 'classification system 2' of smart city initiatives, which lists the main application domains observed across a series of case studies analyzed by various authors, aligns with a picture which is skewed towards the idea of a successful, growing and increasingly hard to manage urban center. Prevalent are applications focusing on the management of resources, efficiency improvements, service delivery, safety and the valuing of cultural heritage. Whilst none of these is of course wrong per se, and all are needed in a general sense, the near absence from such picture of different initiatives trying to address other, socially relevant themes is something to reflect upon. The discourse of the growing and almost runaway urban machine in need of fixing does help shrouding and distracting attention from other, though radically different, perspectives. Before discussing these we also need to look at the problem from another viewpoint. Interpreting the city as rapidly urbanizing, growing and being subjected to increasing consumption and mobility issues and a desire for control, safety and cleanliness, also implies a relatively narrow focus on who the 'citizens' are, how they use and inhabit their urban places, and what issues matter to them.

Who Are the Smart Citizens?

Robert Hollands (2008) outlines how wide and complex the range of interpretations of the 'smart city' concept can be. But he also remarks how this ends up being generally simplified and its aims seen as very much aligned with a gentrified vision of urban economic development, all geared towards certain classes of citizens. Instead of representing a change of direction, an innovative view and approach, it can very much mirror and reinforce the trend:

The smart/creative city can become not only more economically polarized, but also socially, culturally and spatially divided by the growing contrast between incoming knowledge and creative workers, and the unskilled and IT illiterate sections of the local poorer population (Peck, 2005; Smith, 1996). Urban gentrification in this regard, refers not just to housing and neighbourhoods as it once did (see Butler,

1997), but increasingly to consumption, lifestyle and leisure in the city (see Chatterton and Hollands, 2002) (Hollands, 2008: 312).

Such a vision of a dominant – and somehow desirable – category of highly skilled, exigent and mobile city dwellers and indeed visitors, with specific lifestyle and ‘quality of life’ needs, has been repeatedly highlighted by various authors (see for instance Sorkin, 1992 and Wilson, 1995) critiquing an increased commodification of public space beyond – and before – any smart urbanism discourses. These new mobile middle classes with disposable income and a need for “the finest features and benefits (...) history, culture, safe neighbourhoods, good housing, shops and education, and progressive local government” (Boyer, 1993: 125), bring with them a skewed view of what themes are important and what urban environments can do for their citizens. Anna Minton, another author who has extensively commented on the control and commodification of UK cities, has referred to the Business Improvement District (BID) model as a leading, key example of such trend. This model implies the prioritization of certain needs which are seen as coherent with the shopping-related needs of urban users: “The first layer on which the whole structure depends is the creation of a clean and safe environment, so just as man needs to breathe and eat to survive, these parts of the city need to be clean and safe. The next layer is ‘transport and access’, the level up is ‘marketing and branding of the area’ and the apex is the creation of a ‘memorable experience for visitors’” (Minton, 2009: 43)

The reassuring and business-friendly features of a service-rich, clean and safe environment, with good transport links and offering a ‘memorable experience’ to citizens who very much behave like visitors, are in fact largely echoed by smart city technology offerings, and celebrated by the related commercial literature. The prevalent, mainstream visions of smart urbanism involve an urgency to address the needs for cleaner and environmentally more sustainable towns, though with a marked focus on high-middle class expectations whilst – as previously noted by Hollands (2008) – celebrating the role of cities as centers of attraction of highly-skilled, wealthy and mobile urbanites involved in a growing knowledge economy. Hitachi’s Smart Cities website for instance warns about “the growth of slums, air pollution, the difficulty of acquiring fresh drinking water, the treatment of waste water and sewage, energy supplies, traffic congestion, and waste disposal”. It however presents solutions evoking a series of scenarios about ‘Living in a Smart City’ which are strongly skewed towards the needs and expectations of a mobile and wealthy middle class. These range from “Freedom to Work When and Where you Want” to “Convenient Vehicle Use as Part of the Community” and “Well-balanced Lifestyles in Tune with How People Live” (Hitachi website). Similarly, GSMA’s Connected City initiative and exhibition claims to address “making homes and cars smarter, travel swifter, shopping easier and urban living safer and more environmentally friendly” (GSMA website). GSMA also keeps a ‘Smart City Index’ categorization and ranking, which interestingly is based on indicators named “Smart Mobile Services”, “Business, Economic and Mobile Cluster Impact”, “Smart Mobile Citizens” and “Mobile Infrastructure” (GSMA Smart City Index). Another notable example is the impressive Living PlanIT documentation on what has been defined as the blueprint for an ‘urban operating system’. This also makes explicit reference and places great emphasis on the importance for cities to foster knowledge economies, and how smart urbanism can be central to it, arguing for “strategies to increase the sophistication of their populations to service and attract advanced industries” (Living PlanIT, 2011: 4).

Such rhetoric bases its strength on offering a simplistic but easy to communicate message about the smart city. This is so effective that even non-commercial, government-funded bodies promoting research and development have readily adopted it. In its much-diffused short animated video introduction to the theme, titled ‘A Glimpse at Cities of the Future’ (Innovate UK, YouTube content), Innovate UK ends up echoing and promoting commercial smart urbanism clichés. This is done by offering a vision of the future ‘city’ which is generic and entirely dominated by examples of

technology deployed to assist lifestyles of a consuming middle class living in individual houses, concerned with shopping and aspiring to a sanitized, safe and socially homogenous environment.

The smart city of the future is therefore described through the following imagery:

time	Imagery
0:25	Well-dressed couple enjoying what is hinted at being a somehow 'smart' penthouse or luxury flat while relaxing on sofa
0:48 – 0:53	Panoramic view on modernist-looking city. Skyscrapers and tidy riverside park with people relaxing and walking
1:01	Generic residential buildings with solar panels on roofs
1:03	Trafficked urban bridge with wind turbines embedded in main structure
1:07	Fairly abstract picture of (seemingly) solar generators in generic luxury condo complex with many well-kept flower beds
1:17 – 1:27	Smart high street: shopping mall-like imagery with shops organized in levels, galleries and escalator-based vertical circulation. White lady trying dress combinations in front of a smart mirror in a shop. White mother with child on lap entering another shop through automatic doors
1:36 – 1:43	Self-driven taxi/pods picking up well-dressed people
1:56 – 2:02	Robotic pizza delivery cart/pod delivering food to contemporary terraced house
2:13 – 2:18	Organic-shaped buildings in clean, park-dominated city. Flying drone either delivering something or maybe patrolling area, whilst happy-looking family of three talks with policeman (Figure 1)

Amongst other things it is revealing how this whole 'city of the future' picture very much resembles an idealized and sanitized version of the city of the present, or better of the BID-like component and commercial development aspirations of a certain view the city of the present. It is also strongly exclusive towards a specific 'model' citizen and some of their most banally perceived needs like safety, shopping, buying take-away food and having energy aplenty. Virtually no problematization, critique and re-invention of lifestyles as well as urban morphology, inhabitation, work, models of service delivery etc is offered in such vision which is nevertheless supposed to somehow communicate and summarize combined academia and industry R&D efforts. What could be expected to be daring and perhaps quite 'lateral' in setting down ideas for imagined futures, particularly as it comes from a research publicly funded agency, ends up being socially narrow and conservative, only trying to feel futuristic through an elementary declaration – through imagery – of the presence of high technology in modernism-inspired, generic environments. It can be argued that – beyond its hi-tech content and promise – the prevalent way the smart city is imagined and marketed tends to share and reinforce the same bias towards control, branding and a relative insensitivity to local contexts that a certain type of economic development-driven production of physical urban spaces has shown in the past few decades. What is being portrayed as a technological revolution does not seem to be underpinned by any particular idea for a progressive model, either in socio-economic organization or indeed civic design. Hollands's observations fundamentally still stand, though in a different, evolved and more technologically sophisticated landscape.

Figure 1: Smart city imaginary in Innovate UK's short video. *Source: Innovate UK YouTube channel*

What is most problematic with this narrow, sanitized interpretation of the future city, is its exclusionary rhetoric. Smart city-in-the-box solutions that envisage a seamless urban experience from the connected home, to the use of Wi-Fi-enabled transport to the hyper connected workplace, assume a particular digital citizen that bears little resemblance to those living at the margins. The

digital fantasy can easily translate into an analogic nightmare for some. Examples from the global South are again quite fitting and perhaps the most blatant in terms of showing how socially skewed smart visions can be. As shown in Datta (2015; 2018) and Das's (2015) ongoing work on the smart city programme in India, there are important questions to be asked regarding citizenship and exclusion (Datta 2015; 2018). Not only do smart city interventions have little contextual relevance but they also have impacts on livelihoods in inequitable conditions. The largely infrastructure-led approach to the implementation of smart city programmes runs the risk of perpetuating inequality, at worst, but misses an opportunity to use technology to enhance livelihoods, at best. The relationship to informality, hence a significant aspect of 'context', for example, is largely unexplored, yet the footloose nature of technology enables an intimate relationship between livelihoods and smart appropriation (Odendaal, 2014). Thus, the relationship between smart city and responsive place making has transformative potential, yet has recently become a code for particularly reductive trends of area-based regeneration and master planning.

The smart city can therefore be a simple, digitally-enhanced way of re-packaging and re-mediating recent forms of commercial urbanism by providing new ways to boost a certain vision of the city and its 'users' further. The 'smart citizen' uses the city in a way that implies high levels of mobility, and the need for ubiquitous services to support such mobile and knowledge-based occupations. It is assumed that the smart citizen is very conversant with high and mobile technology, can afford all sorts of hi-tech gadgetry, and is willing and expecting to interact with advanced systems of data feeding and reporting. It is also assumed that such citizens are themselves highly mobile and potentially disloyal – they can move somewhere else easily – hence behave as the paying customers of the city. The latter is therefore driven to provide them with the control, services, safety and cleanliness they expect, which is why it needs to become smarter. Most proposed projects do not question any of the typical high-middle class models of living, or address alternative views. For instance, the motor car and its presence in the city is never particularly put in doubt or challenged, but is remediated by technologies that offer enhanced ways to use it. These can for instance envisage ride-share mechanisms on autonomous vehicles, a 'smart' vision critiqued as still less efficient than buses (Walker, 2018), or easily find parking spaces (see for instance Lamba, 2013), in the attempt of making individual vehicles appear more socially and environmentally acceptable.

Getting Out of the Smart Box

How do we then re-focus and widen our understanding of what the smart city could be – and what it could address and re-invent – moving away from the dominance of the visions discussed so far? As Hollands (2015: 70-71) points out (referring to Hill, 2013) what we need could be "to shift the debate about smart cities towards the *raison d'être* of cities— the people and citizens who live in them", and away from an assumption of high technology being the main – or even sole – agent within an otherwise static view of the city as a platform functional to the over imposition of high tech devices and networks. This implies first of all widening the range of urban issues and the views of what matters in the shaping and re-shaping of urban environments. We need to get out of the simplistic 'smart box' as described above and be more inclusive of city types and issues.

Discussing a series of major challenges faced by urban designers – and urban landscapes – Loukaitou-Sideris (2012) remarks how "most urban development happens within the context of a market-driven urbanism that often produces 'over-scaled, sterile places or mildly greener versions of conventional development'" (p.468). But this is seen as making such exercises relatively irrelevant and "unable to inventively confront the morphological, functional, and human needs of cities and citizens" (Sorkin, 2009: 155). In identifying a series of important challenges for urban designers, Loukaitou-Sideris looks at US towns and highlights themes, which have in common the need to look

at diversity – between and within cities themselves – and at shaping such places in as inclusive ways as possible. Cities are therefore seen as facing sometimes opposite development trajectories, with an emphasis on the differential challenges posed by both “edgeless” and “shrinking” cities (473), the latter a model in various ways relevant to a multitude of urban centers in both the global North and South which have very little to benefit from ‘solutions’ thought and tailored for their sprawling and economically growing counterparts. Similarly the issue of the presence of informal “ethnoscapes”, “traditionally inhabited by the poor” and “separated from the flashy landscapes of the formal city” raises the observation that “By and large, contemporary urban design practice has not used culture as a determinant of design. While modernism’s ‘universality’ has been condemned, local and cultural idiosyncrasies have often been ignored” (471). As soon as our gaze moves away from the pre-packed smart discourses, back to looking at the city – and in this example urban design theory – the need to enrich, expand and re-focus our consideration of what smartness could and maybe should be for emerges. This re-focusing starts from place and its complex and rich dimensions.

It is interesting therefore how Hollands himself (2015) when considering alternative and more inclusive and sustainable approaches to smartness, highlights examples all based on highly local, contextual factors and involving community-based ideas. What is probably the most relevant aspect of those choices is exactly the fact that high technology is just an ingredient in the projects, not necessarily the main one and certainly not the motivator or the generator of the vision, which is based on local participation and agency on changing place, and cooperative re-invention of aspects of urban living. Moreover, the examples tend to be somehow bespoke, hyper-local and dependent on contextual conditions and opportunities.

These considerations are important as they can further extend and enrich the strategic principles identified by Mora et al (2018) further reinforcing the role of place as both generator and main focus of a more sustainable smart city. The needs to build strategic frameworks, widening participation and collaboration, and combine top-down with bottom-up logics can be confronted with a series of more ‘existential’ questions and challenges about the smart city. Is high technology being leveraged to face and re-invent urbanity on key themes or does it simply provide some tech-fix to the status quo? What do smart city efforts really understand of the city they are dealing with? Are they stemming from and valuing local resources (human, cultural, natural etc) to provide endogenous, sustainable and sensible ways to produce, inhabit and manage the city? Are local energies and agency included? And who/what has agency above all, assuming that technology cannot and should not be seen as the sole factor of change? Communities of course have an important role (see, for instance, de Lange and de Waal, 2019), yet working in an integrated way on technology, people and indeed physical space – so on multi-dimensional notions of place – seems key to an alternative way of seeing smartness.

Towards Sustainable Smart Places

We are mindful of the potential for smart technologies to enable innovation in urban efficiency, which is something stemming from a longer-standing legacy. As Dear has noted, Modernist planning discourse at the beginning of the twentieth century “had been realigned to emphasize ‘unity’, ‘control’ and ‘expert skills’” (1995: 31). The belief in technology as a vehicle towards salvation in troubled times is clearly part of this and perhaps one of the most enduring Modernist sensibilities. Environmental emergencies have presented many layers of challenges for which some infrastructure solutions could play a role. An example is the central operations center in Rio de Janeiro, Brazil, a visible example of IBM/municipal collaboration towards producing early warning systems in anticipation of climate change events. Following a flash flood in 2007 that took the city by surprise, the company, together with CISCO and the local authority developed an integrated disaster response

and monitoring system that integrates 32 agencies and services and relies on 400 active cameras in the city for continuous surveillance. But these things do not come as neutral and un-problematic. As in most socio-economically divided cities, the concern is that only well-off neighborhoods benefit and that it is an interim measure that detracts from real infrastructural problems. An interesting example of this that we have come across concerns that all-important aspect of smart living which is crime protection and personal safety. Our 2015 research visit to Brazil, part of an ESRC/Newton-funded RCUK-CONFAP International Network project titled 'Augmented urbanity and smart technologies: how "smart" are our cities becoming?' highlighted how strongly related perceptions of crime and the development of 'smart' projects were in that country. The Vigilante app (www.vigilanteapp.com.br) was a prominent startup-generated project on crowdsourced crime mapping, presented as one of the elements of a 'bottom-up' smart trajectory. It offered an interesting and more transparent alternative to the centralized surveillance control centers present in many Brazilian cities. This was initially piloted in the city of Salvador de Bahia during 2015, though now is commercially offered to a wider Brazilian audience. The app aims at enabling the general public to collaboratively report and geo-locate disorderly, criminal or 'problematic' occurrences in their city, constructing a publicly available online map of these. When this was demonstrated to one of the authors, however, the image of Salvador resulting from the app was almost reversed – in terms of safety and needs to improve – to what local common knowledge suggested. The majority of crimes and problems reported were located in well-off areas of the city, with the favela-dominated neighborhood in North-West Salvador showing very few issues (Figure 2). This was clearly not purposefully designed by Vigilante, yet it might suggest a non-surprising differential adoption and handling of the tool, which would be prevalently appealing to, and used by, middle class citizens concerned for their safety. Such a preponderance gives them a privileged position in leading on the perception of crime, and on where to intervene on it, within the city. Moreover, some of these tools – another one being developed at the time was called 'Onde Fui Roubado' ('Where I Was Robbed') – embedded specific choices like the reporting of robberies only. As these happen and are reported mainly where there is wealth that can be stolen, they can also heavily contribute to distort the resulting image of the city.

Figure 2: Crowd-sourced reporting of crime in Salvador, Brazil. *Source: Vigilante App*

Questions therefore remain on how distributed the benefits of smart technologies are. Material solutions such as smart grids and water consumption monitoring devices provide innovative operational solutions but largely bypass those falling outside the ambit of networked infrastructure. Interestingly, the popular literature on smart cities tends to favor a networked approach also. However, smart city-in-the-box solutions that envisage a seamless urban experience, from the connected home, to the use of Wi-Fi-enabled transport, to the hyper connected workplace, assume a particular digital citizen that bears little resemblance to those living at the margins. Here we refer to the edges that are often rendered invisible in mainstream infrastructure policy and practice. It could be the immigrant communities that live in overcrowded rooms or those sleeping rough on Northern city streets or the many that live in informal settlements in Southern cities. But it is imperative to note how such 'margins' have been expanding rather than contracting as any trickle-down economic vision, 'smart' or otherwise, might suggest, and now include more urban dwellers who might have been previously identified as part of the middle classes. As noted by Cloke *et al* (2016, p.704) evidence of increases in food insecurity – and the consequent use of food banks by growing chunks of the population of 'First World' countries – is widely discussed and documented for a range of countries in North and South America, Asia and Europe. In the UK, the Trussell Trust food bank network reported constantly raising demand in use from 2013, with a further 13% increase in April-September 2018 respect to the same period in 2017 (Trussell Trust website). In

many cities of the global South the margins are more immediately discernable as the informal economy provides livelihoods for job seekers unable to find employment, and lack of housing opportunities in sprawling cities result in shack settlements. These margins, whether they constitute the majority or not, are largely disconnected from the smart dream.

Not only these are disconnected, but local sense of place is underplayed and possibly assumed to blend in with digital visions. There are two dimensions to this problematic tunnel vision. The one is that the formulation of 'the problem to be solved' is at best, narrow, and at worst, simply wrong. Problematizing urban growth falls into the age-old trap (reflected in early urban planning history) of assuming that the city can be 'tamed' through scientific rationality and imposition of generic predetermined models. Local context is ignored, thereby bypassing endogenous urban character and potential solutions. Recent work on Indian smart urbanism raises the ethical and moral challenges associated with the deployment of smart cities in the global South in particular (Datta, 2015). Examples of these are the social costs incurred in the construction of smart neighbourhoods or cities, leading to displacement of people, and material impacts in terms of public spending that should prioritise immediate basic infrastructure such as water and sanitation. Poor urban dwellers seldom benefit from grandiose urban visions such as that portrayed in the smart city narrative.

The second dimension that we critique more specifically is the loss of potential to enable truly sustainable, resilient cities that respond to local dynamics of place. The two issues of social exclusion and de-contextualization come together and highlight the importance of urban space and place and the need for considering and including interstitial spaces. Smart city technologies, allow and encourage – under logics of efficiency and rationalization of movement – point-to-point interest. The efficiency of digitally enhanced navigation – and even more so the possible advent of the autonomous vehicle – replaces the serendipitous, inefficient appreciation of interstices and the not necessarily negative chance of getting lost and discovering something or someone, as argued by Shapiro (1995) at the dawn of cyberspace-related debates, and more recently by Foth (2016). There is a desired 'seamlessness' that aims to reduce friction of movement and decision-making into a designed, optimized 'whole'. This can therefore undermine the value and role of 'interstitial' spaces in the city, which "represent what is left of resistance in big cities – resistance to normativity and regulation, to homogenization and appropriation" (Nicolas-le Strat, 2007: 314) – both in spatial and social terms. These spaces of resistance are not necessarily confined to event-driven social action (such as occupations or protests), and they are very much part of many people's 'everyday'. In the global South, these 'interstices' are what define many urban spaces and extend to the use of technology. The informal urbanization that typifies urban growth in cities in Africa relate to how people house themselves and pursue their livelihoods.

Thus, from a research perspective, there is a need to consider cities as collectives of places embedded with meaning. The question at this point can be: how can this be steered – or maybe hacked - in more transformative, adaptive, socially sustainable and place-intelligent trajectories? How do we uncover these stories through research and learn from them? The value of case-based, contextually embedded research that focuses on the interactive agency between technology and people is invaluable.

There are two related tensions that surface with regards to the relationship between the fantasy smart city, and the somehow neglected but richer 'analogic' city through which people move and pursue their lives. The one relates to the contrast between the pre-designed and programmed spaces of consumption and prioritization of the knowledge-based economy and the incremental and messy continuous unfolding of the 'real' city. The second refers to city as an imagined future of

order, seamlessness and low friction mobility that contrast the contingency and emergence of present urbanity. In 'interstitial spaces' technology appropriation towards resilience is strongly informed by livelihood conditions and strategies. They are strongly tied to place. This requires an interrogation of the uniqueness of place and the stories that inform the qualities that contribute to such. Uncovering these 'lateral' and contextually-rich technology appropriations can and should be looked at as alternative approaches to the mainstream smart city. Documenting place-responsive practices contributes to re-thinking urban spaces under a more socially sustainable (and socially-intelligent) light. The sustainable smart city cannot ignore the power and relevance of context. Scarce attention to local values, culture, knowledge and indeed space can result into making the machine-space rigid, blunt and insensitive; as argued by Sassen: "What stands out is the extent to which these technologies have not been sufficiently 'urbanized'. That is, they have not been made to work within a particular context" (Sassen, 2011). What this paper has been arguing throughout is a need to fundamentally flip the perspective on shaping and developing the smart city. This involves valuing specific civic knowledge, character, issues and resources, down to the hyper-local dimension, and using these to drive and direct innovation. It means informing 'smart' from within the city, rather than relying on a 'in-the-box' product-based version of it.

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From 'Smart in the box' to 'Smart in the city' – rethinking the socially sustainable smart city in context

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From 'Smart in the box' to 'Smart in the city' – Rethinking the Socially Sustainable Smart City in Context

Abstract

This paper focuses on the importance of framing and conceiving smart urban initiatives and schemes in a highly context-sensitive way, and argues that place-based approaches are essential for enhancing the social sustainability of smart cities. It does so highlighting how such perspective is often ignored by discourses and visions that favor generalized and socially skewed ways of framing the 'city' as well as the citizens who are expected to become 'smart' and benefit from high technologies. These, the paper argues, leave out the important nuances and social and spatial 'interstices' that make places unique, and by doing so weaken the ability of smart to be inclusive and afford a rich landscape of technological appropriation making cities more resilient.

Introduction

The smart city narrative has recently become closely associated with the concept of sustainability. Early warning systems and control room monitoring enabled through sensor technology make an important contribution to mitigation and anticipation of the shock impacts of climate change. Smart grids and water monitoring systems enable resource efficiency and feedback loops. Whilst the operational elements of smart cities are largely uncontested, there nevertheless exists a need to shine a sharper light on the long-term sustainability of digital urbanism. Concerns have emerged regarding the packaged smart city: the delineated norms and standards, technological fixes and comprehensive marketing solutions to complex urban problems, promoted by multinational software and hardware firms. In this paper, we refer to this prevalently pre-packaged, product-like version of the smart city, as the 'smart in a box' and interrogate the social sustainability of technology-driven solutions to complex social issues. In writing this paper we aim at looking at a number of initiatives, most of which have been reviewed before, but in a way that frames and highlights a different interpretation of this phenomenon and argues for the 'smart city out of the box' or a 'smart *in* the city' approach to incorporating digital technologies and media into context-sensitive city making. The central position of the paper is that this is significantly more socially sustainable. While we posit a particular argument with regard to how we think about technology-embedded urbanism, our intention is to provide an alternative lens to analyzing and understanding the nature of smart urbanism. Foregrounding the technical aspects of smart, we argue, makes the qualities of place and the human agency that crucially contribute to city-making invisible. Revealing and re-affirming these and their role through research, and then re-embedding them into smart urbanism practice, is fundamental to constructing a socially sustainable vision of the future city.

The paper structure unfolds as follows: we begin discussing what is often a pre-packaged, generalized and idealized interpretation of what the city (and the smart city) is. This is referred to across this paper as the 'smart city in a box' to highlight the over-simplification of the civic concept and the standardization of issues in much of the smart-related discourse and practice. We provide a critique that questions notions of citizenship and social sustainability embedded in the assumptions that drive many of these initiatives. The increasingly ubiquitous nature of the smart city narrative – its policy mobility and application to many parts of the global North and South - necessitates a global perspective. The purposeful inclusion of literature on the global South has implicit and explicit aims in this regard. We argue from a standpoint of multiple urbanisms, where qualities such as informality and urban inequality emphasized in the literature on cities in the global South, are acknowledged as issues that resonate globally. More explicitly, we recognize that the work on cities of the global

South provide valuable insights into the many challenges and potential solutions that potentially enable more socially sustainable cities. In short, a global focus that learns from the north and south provides a more robust resource for exploring what a socially progressive and sustainable smart city could look like. We further conclude on the implications this work would have for future research on sustainable smart cities.

Problematizing Sustainable ‘Smart’

Defining what a smart city is or might be is an exercise that can range from the apparently obvious to the near impossible. The vast amount of publicly available information about smart city-related concepts, products and envisaged solutions mirrors the utopian hype that Graham and Marvin (1996) critically described as characterizing the emergence of urban advanced telecommunications and cyberspace at the end of the 20th century. Much of this presents a generic concept of the smart city as an urban revolution in the making. While concepts of smart do not necessarily entirely or exclusively align with views of ‘digital’ urbanism (see for instance Caragliu et al, 2011), any quick Internet or literature search will reveal how the role of ICTs dominates how the phenomenon is described. This ‘revolution’ seems always to be enabled by a series of technological products – be them infrastructural or software-based ones – and ‘solutions’ that can be superimposed on and merged with elements of the built environment in both newly and appositely built towns, or as retrofits to existing cities. The visual language of corporate smart city visions reveals an ‘ideal city’ that forms a coherent whole, seamlessly connected through ICT infrastructure and run on big data. Recently the development of check boxes of codes and standards further perpetuates the ‘city/neighborhood in a box’ idea. This pre-packaged city concept vastly contrasts with the messy textures of the real city. The ubiquity and homogeneity of the visual language of these visions (Rose, 2017) highlights how particularly stark the contradictions between what is idealized and what is real are. These are stronger for cities which do not conform to the one-size-fits-all large, hi-tech metropolis model offered, and are even more blatant in the global South. Furthermore, the language of smart is often used to market edge cities/neighborhoods that perpetuate urban sprawl. These urban fantasies, as Watson (2014) refers to them, are not only indicative of exclusionary urban development, but also real estate interests driving a spatial vision that defies sustainable and compact urban development (Ballard et al, 2017).

More critical accounts of the phenomenon have of course highlighted how diverse and complex this landscape is. Various typologies have evolved in the corporate and governance spheres of what smart cities are capable of, and should be addressing. Three trends in contemporary discussions in the media and literature are discernable (Odendaal, 2016). The first is a seemingly more direct engagement with the social and cultural coordinates of urbanity. In many cases this is marketing language used to augment corporate agendas, a visual language that emphasizes global connection and a ubiquitous urban vision of enhanced efficiency and seamless service delivery. The second is an engagement with natural sustainability and specifically climate change (Cowley et al, 2018), reinforcing the relationship between resilience, early warning and disaster management and intertwining with the ‘eco-city’ concept (Caprotti, 2014). The third shift is an explicit acknowledgement of other infrastructure services (Odendaal, 2016). The relationship between ICT and other utilities has always been implicit. Municipal utility billing systems rely heavily on centralized information capture and processing for example. Explicit references to technology enabled management of services and digital innovations such as smart grids focus on the interrelationship between utility parts. What emerges is a narrative that suggests comprehensive city making through technological connection; a “modern infrastructure ideal” (Graham and Marvin,

2001) where the connection between the technical and the social, the technical and the natural, and between infrastructure functions all contribute to seamless and efficient urban systems.

To make sense of tentative and partial accounts of this range of work and approaches, Mora et al (2017) offer – through a bibliometric longitudinal analysis of research – an extremely useful overview of the status and directions of the debate, beyond the hype easily found on the Web. This on the one hand confirms the strong role of what the authors call a ‘corporate’ tech-driven model of the smart city, which “fails to account for the social and cultural challenges that smart-city developments pose in anything but technological terms” (p.19). However, a strand of mainly academic literature pointing at a ‘holistic’ and ‘human-centric’ interpretation of the phenomenon and its opportunities is identified as a promising counterpoint to technocratic rhetoric.

Adding to, and complementing those observations, the point this paper wants to highlight is that the prevailing discourses on the smart city, certainly the ones with a commercial, technocratic root but also part of the scientific, R&D and critical accounts, whilst perhaps calling for a degree of connection with an often generic concept of ‘community’, tend to encourage thinking which is not as deeply engaged with the local context where smart ‘concepts’ are proposed and applied. Furthermore, it can be argued that the specific challenges and opportunities offered by place need to be brought into the fold, and require contextually embedded responses if any smart solutions are to be socially sustainable. The ‘smart city’ is too often framed as a general construct responding to generalized challenges and conditions – and often offering generalized products as ‘solutions’ to these. This in turn makes smart urbanism much less of a re-invention of place and more of a re-mediation (Bolter and Grusing, 1999: 182) and technological fixing of take-for-granted and partial views of what the city is and what its citizens do and need. Smart seems – in other words – much more of a hi-tech endowment of the status quo, and confirmation of a recent middle-class oriented drive toward urban development and management trajectories, than a movement supporting any major re-invention of how we conceive urban space and more generally inhabitation. We argue that this leaves little room for the structural changes and fresh thinking necessary to enable social and ecological sustainability. At worst, the smart city policy discourse can become a smokescreen that distracts from the more immediate issues facing a city (Watson, 2014). Furthermore, the generic problem formulation, and codified smart solutions that emanate from such analyses, leave little room for local innovation. This can be observed in the ways both the ‘city’ and its problems, and life within it – so the ‘citizens’ – are interpreted within much of the debate. In order to formulate sustainable smart city responses that are cognizant of the structural parameters of urban spaces as well as the local conditions that inform citizen-led responses, we argue for a more textured understanding of the ‘analog’ city and its relationship to technological evolution.

Constructing the (Smart) City

Digital technologies, hardware sensors and devices, software and big data – the fundamental components of smart urban systems – promise ways to understand and manage increasingly complex systems. Their affirmation calls for the ‘city’ to be interpreted as a critical, over-complex entity, which changes very rapidly and has become about unmanageable through traditional approaches. The spatial problem, therefore, focuses on the expected trajectories of sprawling, growing large urban centers. This is an approach that transcends and somehow precedes smart city debates and has been noted in a more general sense by Robinson (2006) who argues that “Because the analysis of global- and world-cities theorists have come to rely on identifying the significance of cities to only certain elements of the global economy, cities that are poorer, marginal to key

globalizing economic sectors or, as Manuel Castells (1983) puts it, 'structurally irrelevant' receive very little attention in this approach" (p.99). But this fits particularly well the logics of corporate smart urbanism, as economies of scale coupled with the ability to conceive easily transferable systems and 'solutions' are a key enabler of a prospected commercial offer. Therefore the city is conveniently problematized through the need to find ways to cope with large scale and growth, and the prospect of managing future 'megacities' as a consequence of unstoppable urbanization tends to be the vastly prevalent interpretation offered of the urban condition. This involves dealing with 'more': more energy consumption, more vehicular traffic, more pressure on natural resources, more people including any perceived strain from immigration - and so on. The spectre premise of mass urbanization is repeated in the introductions to most documents marketing smart technologies for cities (see for example Team Ambrosus 2018 on the Ambrosus.com blog). The 'usual suspects' of highly ranked smart cities - Singapore, Barcelona, New York, Amsterdam and London - together with purpose-built new towns like Songdo or Masdar (Forbes, 2018; Ierek, 2018; Chaturvedi, 2018) are provided as models for construction of smart cities elsewhere and for the ideas they can embed.

These cities are clearly different from each other, but they all respond to a characteristic in common: they are seen and represented as successful, growing cities (or ready to grow in the new towns case) which face a series of possible issues with resources, capacity, pollution and the management of mobility. They need to act to avoid becoming victims of their own success and the consequences of over-population and an erosion of safety, environmental quality and more generally quality of life. More than an opportunity to conceive new forms of urbanism then, and with them new economic models, smart technologies are presented as a necessary set of remedies for protecting the city and equipping it to grow in a controlled and safe way. The case for the smart city is therefore often made by employing emergency discourses, which depict the urban condition as critical if not actually terminal, and highlight the desperate need for urgent technological fixes. Cities are described as "ill-equipped to deal with the shift in population and lack the necessary scale of infrastructure required to support it" (Living PlanIT, 2011). Anil Menon argues on the CISCO blog that "With limited resources, obstacles that range from traffic congestion and pollution to infrastructure constraints and overcrowding are increasingly amplified – all of which requires a paradigm shift in how we approach and manage these types of situations" (Menon, 2013). Similarly, Schneider Electric argues on its website that "Cities face huge challenges: congestion, pollution, blackouts, crime, debt and rising costs - while competing with each other for investment, jobs and talents. Cities need to become smarter: more efficient, sustainable and liveable" (Schneider Electric, 2014), and GSMA remarks that "To ensure that the cities of the future are safe and healthy places to live and work, smart city initiatives are being established globally" (GSMA Connected Living website).

The global reference in the GSMA and other mainstream smart narratives is not incidental, and suggests a global homogeneity of issues and the consequent suitability of global solutions. As the adoption of a rhetoric of urban crisis due to exponential growth, coupled with the challenges of climate change adaptation and monitoring, suits the smart city discourse so well, the sprawling mega-cities of the South can also naturally provide both a critical-mass market and a test bed for these technologies. The smart city phenomenon is no longer simply a Northern idea. The corporate mobility of the notion of smart, together with other fashionable terms such as 'eco' and 'world-class' provide politicians and investors with the motivational discourses to justify smart city initiatives. The Modi regime in India has engaged in creating 100 smart cities in India in 10 years. The language resonates with that used in the global North. Smart cities are defined as "cities that leverage data gathered from smart sensors through a smart grid to create a city that is livable, workable and sustainable" (Sethi, 2014). Private companies such as IBM and Cisco are touted to invest in smart grid infrastructure while the government of Singapore is claimed to be interested in supporting the

1 construction of 10 smart cities on the Delhi-Mumbai industrial corridor. The *Business Standard's*
2 Sunil Sethi (2014) speaks of it as a "... fuzzy, New Millenium fantasy", with technology hubs such as
3 Bangalore and Hyderabad's technology districts coexisting with slums and *chawls*.

4 However, references to social sustainability and contextual engagement are tenuous. The emphasis
5 tends to be on improved quality of life, an emphasis on climate change and the fact that
6 vulnerability to floods and storms in over half of developing world is a reality, as well as the need for
7 improved governance (Odendaal, 2016). Technology is the simple, as the panacea for social and
8 environmental ills. The inherent assumption is that the economic benefits of ICT-enhanced service
9 improvement and delivery will eventually distribute to the poor. Efficiency seems to be the key for a
10 better life for all, in an over-expanding city. We – it is argued – are living in cities which are
11 fundamentally out of control, and that is becoming a terminal condition. Such a dystopia can be
12 counter-balanced by the soft utopia of smart fixing. As Söderström et al (2014) argue in their
13 revealing analysis of IBM's Smarter Cities' discourse: "'smarter cities' is a mild utopianism: it
14 promises efficiency rather than paradise on earth" (p.316). Digitally-assisted urbanity brings with it
15 the benefits of the de-materialization of otherwise polluting processes (as Benedikt had argued in
16 1991 in his celebration of the emergence of 'cyberspace'), universal services, and above all expert
17 systems which assist living and moving, and manage the otherwise spiraling out of control issues.
18 The analysis on strategic trajectories for smart city developments carried out by Mora et al (2018)
19 tends, if anything to generally confirm the presence of such bias. Particularly, what is described in
20 the so-called 'classification system 2' of smart city initiatives, which lists the main application
21 domains observed across a series of case studies analyzed by various authors, aligns with a picture
22 which is skewed towards the idea of a successful, growing and increasingly hard to manage urban
23 center. Prevalent are applications focusing on the management of resources, efficiency
24 improvements, service delivery, safety and the valuing of cultural heritage. Whilst none of these is of
25 course wrong per se, and all are needed in a general sense, the near absence from such picture of
26 different initiatives trying to address other, socially relevant themes is something to reflect upon.
27 The discourse of the growing and almost runaway urban machine in need of fixing does help
28 shrouding and distracting attention from other, though radically different, perspectives. Before
29 discussing these we also need to look at the problem from another viewpoint. Interpreting the city
30 as rapidly urbanizing, growing and being subjected to increasing consumption and mobility issues
31 and a desire for control, safety and cleanliness, also implies a relatively narrow focus on who the
32 'citizens' are, how they use and inhabit their urban places, and what issues matter to them.
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44 **Who Are the Smart Citizens?**

45 Robert Hollands (2008) outlines how wide and complex the range of interpretations of the 'smart
46 city' concept can be. But he also remarks how this ends up being generally simplified and its aims
47 seen as very much aligned with a gentrified vision of urban economic development, all geared
48 towards certain classes of citizens. Instead of representing a change of direction, an innovative view
49 and approach, it can very much mirror and reinforce the trend:
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53 The smart/creative city can become not only more economically polarized, but also
54 socially, culturally and spatially divided by the growing contrast between incoming
55 knowledge and creative workers, and the unskilled and IT illiterate sections of the
56 local poorer population (Peck, 2005; Smith, 1996). Urban gentrification in this
57 regard, refers not just to housing and neighbourhoods as it once did (see Butler,
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1997), but increasingly to consumption, lifestyle and leisure in the city (see Chatterton and Hollands, 2002) (Hollands, 2008: 312).

Such a vision of a dominant – and somehow desirable – category of highly skilled, exigent and mobile city dwellers and indeed visitors, with specific lifestyle and ‘quality of life’ needs, has been repeatedly highlighted by various authors (see for instance Sorkin, 1992 and Wilson, 1995) critiquing an increased commodification of public space beyond – and before – any smart urbanism discourses. These new mobile middle classes with disposable income and a need for “the finest features and benefits (...) history, culture, safe neighbourhoods, good housing, shops and education, and progressive local government” (Boyer, 1993: 125), bring with them a skewed view of what themes are important and what urban environments can do for their citizens. Anna Minton, another author who has extensively commented on the control and commodification of UK cities, has referred to the Business Improvement District (BID) model as a leading, key example of such trend. This model implies the prioritization of certain needs which are seen as coherent with the shopping-related needs of urban users: “The first layer on which the whole structure depends is the creation of a clean and safe environment, so just as man needs to breathe and eat to survive, these parts of the city need to be clean and safe. The next layer is ‘transport and access’, the level up is ‘marketing and branding of the area’ and the apex is the creation of a ‘memorable experience for visitors’” (Minton, 2009: 43)

The reassuring and business-friendly features of a service-rich, clean and safe environment, with good transport links and offering a ‘memorable experience’ to citizens who very much behave like visitors, are in fact largely echoed by smart city technology offerings, and celebrated by the related commercial literature. The prevalent, mainstream visions of smart urbanism involve an urgency to address the needs for cleaner and environmentally more sustainable towns, though with a marked focus on high-middle class expectations whilst – as previously noted by Hollands (2008) – celebrating the role of cities as centers of attraction of highly-skilled, wealthy and mobile urbanites involved in a growing knowledge economy. Hitachi’s Smart Cities website for instance warns about “the growth of slums, air pollution, the difficulty of acquiring fresh drinking water, the treatment of waste water and sewage, energy supplies, traffic congestion, and waste disposal”. It however presents solutions evoking a series of scenarios about ‘Living in a Smart City’ which are strongly skewed towards the needs and expectations of a mobile and wealthy middle class. These range from “Freedom to Work When and Where you Want” to “Convenient Vehicle Use as Part of the Community” and “Well-balanced Lifestyles in Tune with How People Live” (Hitachi website). Similarly, GSMA’s Connected City initiative and exhibition claims to address “making homes and cars smarter, travel swifter, shopping easier and urban living safer and more environmentally friendly” (GSMA website). GSMA also keeps a ‘Smart City Index’ categorization and ranking, which interestingly is based on indicators named “Smart Mobile Services”, “Business, Economic and Mobile Cluster Impact”, “Smart Mobile Citizens” and “Mobile Infrastructure” (GSMA Smart City Index). Another notable example is the impressive Living PlanIT documentation on what has been defined as the blueprint for an ‘urban operating system’. This also makes explicit reference and places great emphasis on the importance for cities to foster knowledge economies, and how smart urbanism can be central to it, arguing for “strategies to increase the sophistication of their populations to service and attract advanced industries” (Living PlanIT, 2011: 4).

Such rhetoric bases its strength on offering a simplistic but easy to communicate message about the smart city. This is so effective that even non-commercial, government-funded bodies promoting research and development have readily adopted it. In its much-diffused short animated video introduction to the theme, titled ‘A Glimpse at Cities of the Future’ (Innovate UK, YouTube content), Innovate UK ends up echoing and promoting commercial smart urbanism clichés. This is done by offering a vision of the future ‘city’ which is generic and entirely dominated by examples of

technology deployed to assist lifestyles of a consuming middle class living in individual houses, concerned with shopping and aspiring to a sanitized, safe and socially homogenous environment.

The smart city of the future is therefore described through the following imagery:

time	Imagery
0:25	Well-dressed couple enjoying what is hinted at being a somehow 'smart' penthouse or luxury flat while relaxing on sofa
0:48 – 0:53	Panoramic view on modernist-looking city. Skyscrapers and tidy riverside park with people relaxing and walking
1:01	Generic residential buildings with solar panels on roofs
1:03	Trafficked urban bridge with wind turbines embedded in main structure
1:07	Fairly abstract picture of (seemingly) solar generators in generic luxury condo complex with many well-kept flower beds
1:17 – 1:27	Smart high street: shopping mall-like imagery with shops organized in levels, galleries and escalator-based vertical circulation. White lady trying dress combinations in front of a smart mirror in a shop. White mother with child on lap entering another shop through automatic doors
1:36 – 1:43	Self-driven taxi/pods picking up well-dressed people
1:56 – 2:02	Robotic pizza delivery cart/pod delivering food to contemporary terraced house
2:13 – 2:18	Organic-shaped buildings in clean, park-dominated city. Flying drone either delivering something or maybe patrolling area, whilst happy-looking family of three talks with policeman (Figure 1)

Amongst other things it is revealing how this whole 'city of the future' picture very much resembles an idealized and sanitized version of the city of the present, or better of the BID-like component and commercial development aspirations of a certain view the city of the present. It is also strongly exclusive towards a specific 'model' citizen and some of their most banally perceived needs like safety, shopping, buying take-away food and having energy aplenty. Virtually no problematization, critique and re-invention of lifestyles as well as urban morphology, inhabitation, work, models of service delivery etc is offered in such vision which is nevertheless supposed to somehow communicate and summarize combined academia and industry R&D efforts. What could be expected to be daring and perhaps quite 'lateral' in setting down ideas for imagined futures, particularly as it comes from a research publicly funded agency, ends up being socially narrow and conservative, only trying to feel futuristic through an elementary declaration – through imagery – of the presence of high technology in modernism-inspired, generic environments. It can be argued that – beyond its hi-tech content and promise – the prevalent way the smart city is imagined and marketed tends to share and reinforce the same bias towards control, branding and a relative insensitivity to local contexts that a certain type of economic development-driven production of physical urban spaces has shown in the past few decades. What is being portrayed as a technological revolution does not seem to be underpinned by any particular idea for a progressive model, either in socio-economic organization or indeed civic design. Hollands's observations fundamentally still stand, though in a different, evolved and more technologically sophisticated landscape.

Figure 1: Smart city imaginary in Innovate UK's short video. *Source: Innovate UK YouTube channel*

What is most problematic with this narrow, sanitized interpretation of the future city, is its exclusionary rhetoric. Smart city-in-the-box solutions that envisage a seamless urban experience from the connected home, to the use of Wi-Fi-enabled transport to the hyper connected workplace, assume a particular digital citizen that bears little resemblance to those living at the margins. The

digital fantasy can easily translate into an analogic nightmare for some. Examples from the global South are again quite fitting and perhaps the most blatant in terms of showing how socially skewed smart visions can be. As shown in Datta (2015; 2018) and Das's (2015) ongoing work on the smart city programme in India, there are important questions to be asked regarding citizenship and exclusion (Datta 2015; 2018). Not only do smart city interventions have little contextual relevance but they also have impacts on livelihoods in inequitable conditions. The largely infrastructure-led approach to the implementation of smart city programmes runs the risk of perpetuating inequality, at worst, but misses an opportunity to use technology to enhance livelihoods, at best. The relationship to informality, hence a significant aspect of 'context', for example, is largely unexplored, yet the footloose nature of technology enables an intimate relationship between livelihoods and smart appropriation (Odendaal, 2014). Thus, the relationship between smart city and responsive place making has transformative potential, yet has recently become a code for particularly reductive trends of area-based regeneration and master planning.

The smart city can therefore be a simple, digitally-enhanced way of re-packaging and re-mediating recent forms of commercial urbanism by providing new ways to boost a certain vision of the city and its 'users' further. The 'smart citizen' uses the city in a way that implies high levels of mobility, and the need for ubiquitous services to support such mobile and knowledge-based occupations. It is assumed that the smart citizen is very conversant with high and mobile technology, can afford all sorts of hi-tech gadgetry, and is willing and expecting to interact with advanced systems of data feeding and reporting. It is also assumed that such citizens are themselves highly mobile and potentially disloyal – they can move somewhere else easily – hence behave as the paying customers of the city. The latter is therefore driven to provide them with the control, services, safety and cleanliness they expect, which is why it needs to become smarter. Most proposed projects do not question any of the typical high-middle class models of living, or address alternative views. For instance, the motor car and its presence in the city is never particularly put in doubt or challenged, but is remediated by technologies that offer enhanced ways to use it. These can for instance envisage ride-share mechanisms on autonomous vehicles, a 'smart' vision critiqued as still less efficient than buses (Walker, 2018), or easily find parking spaces (see for instance Lamba, 2013), in the attempt of making individual vehicles appear more socially and environmentally acceptable.

Getting Out of the Smart Box

How do we then re-focus and widen our understanding of what the smart city could be – and what it could address and re-invent – moving away from the dominance of the visions discussed so far? As Hollands (2015: 70-71) points out (referring to Hill, 2013) what we need could be "to shift the debate about smart cities towards the *raison d'être* of cities— the people and citizens who live in them", and away from an assumption of high technology being the main – or even sole – agent within an otherwise static view of the city as a platform functional to the over imposition of high tech devices and networks. This implies first of all widening the range of urban issues and the views of what matters in the shaping and re-shaping of urban environments. We need to get out of the simplistic 'smart box' as described above and be more inclusive of city types and issues.

Discussing a series of major challenges faced by urban designers – and urban landscapes – Loukaitou-Sideris (2012) remarks how "most urban development happens within the context of a market-driven urbanism that often produces 'over-scaled, sterile places or mildly greener versions of conventional development'" (p.468). But this is seen as making such exercises relatively irrelevant and "unable to inventively confront the morphological, functional, and human needs of cities and citizens" (Sorkin, 2009: 155). In identifying a series of important challenges for urban designers, Loukaitou-Sideris looks at US towns and highlights themes, which have in common the need to look

at diversity – between and within cities themselves – and at shaping such places in as inclusive ways as possible. Cities are therefore seen as facing sometimes opposite development trajectories, with an emphasis on the differential challenges posed by both “edgeless” and “shrinking” cities (473), the latter a model in various ways relevant to a multitude of urban centers in both the global North and South which have very little to benefit from ‘solutions’ thought and tailored for their sprawling and economically growing counterparts. Similarly the issue of the presence of informal “ethnoscapes”, “traditionally inhabited by the poor” and “separated from the flashy landscapes of the formal city” raises the observation that “By and large, contemporary urban design practice has not used culture as a determinant of design. While modernism’s ‘universality’ has been condemned, local and cultural idiosyncrasies have often been ignored” (471). As soon as our gaze moves away from the pre-packed smart discourses, back to looking at the city – and in this example urban design theory – the need to enrich, expand and re-focus our consideration of what smartness could and maybe should be for emerges. This re-focusing starts from place and its complex and rich dimensions.

It is interesting therefore how Hollands himself (2015) when considering alternative and more inclusive and sustainable approaches to smartness, highlights examples all based on highly local, contextual factors and involving community-based ideas. What is probably the most relevant aspect of those choices is exactly the fact that high technology is just an ingredient in the projects, not necessarily the main one and certainly not the motivator or the generator of the vision, which is based on local participation and agency on changing place, and cooperative re-invention of aspects of urban living. Moreover, the examples tend to be somehow bespoke, hyper-local and dependent on contextual conditions and opportunities.

These considerations are important as they can further extend and enrich the strategic principles identified by Mora et al (2018) further reinforcing the role of place as both generator and main focus of a more sustainable smart city. The needs to build strategic frameworks, widening participation and collaboration, and combine top-down with bottom-up logics can be confronted with a series of more ‘existential’ questions and challenges about the smart city. Is high technology being leveraged to face and re-invent urbanity on key themes or does it simply provide some tech-fix to the status quo? What do smart city efforts really understand of the city they are dealing with? Are they stemming from and valuing local resources (human, cultural, natural etc) to provide endogenous, sustainable and sensible ways to produce, inhabit and manage the city? Are local energies and agency included? And who/what has agency above all, assuming that technology cannot and should not be seen as the sole factor of change? Communities of course have an important role (see, for instance, de Lange and de Waal, 2019), yet working in an integrated way on technology, people and indeed physical space – so on multi-dimensional notions of place – seems key to an alternative way of seeing smartness.

Towards Sustainable Smart Places

We are mindful of the potential for smart technologies to enable innovation in urban efficiency, which is something stemming from a longer-standing legacy. As Dear has noted, Modernist planning discourse at the beginning of the twentieth century “had been realigned to emphasize ‘unity’, ‘control’ and ‘expert skills’” (1995: 31). The belief in technology as a vehicle towards salvation in troubled times is clearly part of this and perhaps one of the most enduring Modernist sensibilities. Environmental emergencies have presented many layers of challenges for which some infrastructure solutions could play a role. An example is the central operations center in Rio de Janeiro, Brazil, a visible example of IBM/municipal collaboration towards producing early warning systems in anticipation of climate change events. Following a flash flood in 2007 that took the city by surprise, the company, together with CISCO and the local authority developed an integrated disaster response

and monitoring system that integrates 32 agencies and services and relies on 400 active cameras in the city for continuous surveillance. But these things do not come as neutral and un-problematic. As in most socio-economically divided cities, the concern is that only well-off neighborhoods benefit and that it is an interim measure that detracts from real infrastructural problems. An interesting example of this that we have come across concerns that all-important aspect of smart living which is crime protection and personal safety. Our 2015 research visit to Brazil, part of an ESRC/Newton-funded RCUK-CONFAP International Network project titled 'Augmented urbanity and smart technologies: how "smart" are our cities becoming?' highlighted how strongly related perceptions of crime and the development of 'smart' projects were in that country. The Vigilante app (www.vigilanteapp.com.br) was a prominent startup-generated project on crowdsourced crime mapping, presented as one of the elements of a 'bottom-up' smart trajectory. It offered an interesting and more transparent alternative to the centralized surveillance control centers present in many Brazilian cities. This was initially piloted in the city of Salvador de Bahia during 2015, though now is commercially offered to a wider Brazilian audience. The app aims at enabling the general public to collaboratively report and geo-locate disorderly, criminal or 'problematic' occurrences in their city, constructing a publicly available online map of these. When this was demonstrated to one of the authors, however, the image of Salvador resulting from the app was almost reversed – in terms of safety and needs to improve – to what local common knowledge suggested. The majority of crimes and problems reported were located in well-off areas of the city, with the favela-dominated neighborhood in North-West Salvador showing very few issues (Figure 2). This was clearly not purposefully designed by Vigilante, yet it might suggest a non-surprising differential adoption and handling of the tool, which would be prevalently appealing to, and used by, middle class citizens concerned for their safety. Such a preponderance gives them a privileged position in leading on the perception of crime, and on where to intervene on it, within the city. Moreover, some of these tools – another one being developed at the time was called 'Onde Fui Roubado' ('Where I Was Robbed') – embedded specific choices like the reporting of robberies only. As these happen and are reported mainly where there is wealth that can be stolen, they can also heavily contribute to distort the resulting image of the city.

Figure 2: Crowd-sourced reporting of crime in Salvador, Brazil. *Source: Vigilante App*

Questions therefore remain on how distributed the benefits of smart technologies are. Material solutions such as smart grids and water consumption monitoring devices provide innovative operational solutions but largely bypass those falling outside the ambit of networked infrastructure. Interestingly, the popular literature on smart cities tends to favor a networked approach also. However, smart city-in-the-box solutions that envisage a seamless urban experience, from the connected home, to the use of Wi-Fi-enabled transport, to the hyper connected workplace, assume a particular digital citizen that bears little resemblance to those living at the margins. Here we refer to the edges that are often rendered invisible in mainstream infrastructure policy and practice. It could be the immigrant communities that live in overcrowded rooms or those sleeping rough on Northern city streets or the many that live in informal settlements in Southern cities. But it is imperative to note how such 'margins' have been expanding rather than contracting as any trickle-down economic vision, 'smart' or otherwise, might suggest, and now include more urban dwellers who might have been previously identified as part of the middle classes. As noted by Cloke *et al* (2016, p.704) evidence of increases in food insecurity – and the consequent use of food banks by growing chunks of the population of 'First World' countries – is widely discussed and documented for a range of countries in North and South America, Asia and Europe. In the UK, the Trussell Trust food bank network reported constantly raising demand in use from 2013, with a further 13% increase in April-September 2018 respect to the same period in 2017 (Trussell Trust website). In

1 many cities of the global South the margins are more immediately discernable as the informal
2 economy provides livelihoods for job seekers unable to find employment, and lack of housing
3 opportunities in sprawling cities result in shack settlements. These margins, whether they constitute
4 the majority or not, are largely disconnected from the smart dream.

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6 Not only these are disconnected, but local sense of place is underplayed and possibly assumed to
7 blend in with digital visions. There are two dimensions to this problematic tunnel vision. The one is
8 that the formulation of 'the problem to be solved' is at best, narrow, and at worst, simply wrong.
9 Problematising urban growth falls into the age-old trap (reflected in early urban planning history) of
10 assuming that the city can be 'tamed' through scientific rationality and imposition of generic
11 predetermined models. Local context is ignored, thereby bypassing endogenous urban character and
12 potential solutions. Recent work on Indian smart urbanism raises the ethical and moral challenges
13 associated with the deployment of smart cities in the global South in particular (Datta, 2015).
14 Examples of these are the social costs incurred in the construction of smart neighbourhoods or
15 cities, leading to displacement of people, and material impacts in terms of public spending that
16 should prioritise immediate basic infrastructure such as water and sanitation. Poor urban dwellers
17 seldom benefit from grandiose urban visions such as that portrayed in the smart city narrative.

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19 The second dimension that we critique more specifically is the loss of potential to enable truly
20 sustainable, resilient cities that respond to local dynamics of place. The two issues of social exclusion
21 and de-contextualization come together and highlight the importance of urban space and place and
22 the need for considering and including interstitial spaces. Smart city technologies, allow and
23 encourage – under logics of efficiency and rationalization of movement – point-to-point interest. The
24 efficiency of digitally enhanced navigation – and even more so the possible advent of the
25 autonomous vehicle – replaces the serendipitous, inefficient appreciation of interstices and the not
26 necessarily negative chance of getting lost and discovering something or someone, as argued by
27 Shapiro (1995) at the dawn of cyberspace-related debates, and more recently by Foth (2016). There
28 is a desired 'seamlessness' that aims to reduce friction of movement and decision-making into a
29 designed, optimized 'whole'. This can therefore undermine the value and role of 'interstitial' spaces
30 in the city, which "represent what is left of resistance in big cities – resistance to normativity and
31 regulation, to homogenization and appropriation" (Nicolas-le Strat, 2007: 314) – both in spatial and
32 social terms. These spaces of resistance are not necessarily confined to event-driven social action
33 (such as occupations or protests), and they are very much part of many people's 'everyday'. In the
34 global South, these 'interstices' are what define many urban spaces and extend to the use of
35 technology. The informal urbanization that typifies urban growth in cities in Africa relate to how
36 people house themselves and pursue their livelihoods.

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38 Thus, from a research perspective, there is a need to consider cities as collectives of places
39 embedded with meaning. The question at this point can be: how can this be steered – or maybe
40 hacked - in more transformative, adaptive, socially sustainable and place-intelligent trajectories?
41 How do we uncover these stories through research and learn from them? The value of case-based,
42 contextually embedded research that focuses on the interactive agency between technology and
43 people is invaluable.

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45 There are two related tensions that surface with regards to the relationship between the fantasy
46 smart city, and the somehow neglected but richer 'analogic' city through which people move and
47 pursue their lives. The one relates to the contrast between the pre-designed and programmed
48 spaces of consumption and prioritization of the knowledge-based economy and the incremental and
49 messy continuous unfolding of the 'real' city. The second refers to city as an imagined future of
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order, seamlessness and low friction mobility that contrast the contingency and emergence of present urbanity. In 'interstitial spaces' technology appropriation towards resilience is strongly informed by livelihood conditions and strategies. They are strongly tied to place. This requires an interrogation of the uniqueness of place and the stories that inform the qualities that contribute to such. Uncovering these 'lateral' and contextually-rich technology appropriations can and should be looked at as alternative approaches to the mainstream smart city. Documenting place-responsive practices contributes to re-thinking urban spaces under a more socially sustainable (and socially-intelligent) light. The sustainable smart city cannot ignore the power and relevance of context. Scarce attention to local values, culture, knowledge and indeed space can result into making the machine-space rigid, blunt and insensitive; as argued by Sassen: "What stands out is the extent to which these technologies have not been sufficiently 'urbanized'. That is, they have not been made to work within a particular context" (Sassen, 2011). What this paper has been arguing throughout is a need to fundamentally flip the perspective on shaping and developing the smart city. This involves valuing specific civic knowledge, character, issues and resources, down to the hyper-local dimension, and using these to drive and direct innovation. It means informing 'smart' from within the city, rather than relying on a 'in-the-box' product-based version of it.

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